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ABSTRACT

Summary

The present invention relates to a file management method of digital data stream recorded on a rewritable disk. The present file management method checks the file type if the file is requested to be renamed, and provides a message indicating that disk reproduction would be failed after the file is renamed, if the file type is real-time. That is, the present method informs that file name or directory change requested through a PC would make it impossible to reproduce real-time data files which are recorded in a disk recording medium such as a rewritable digital versatile disk, whereby, file name or directory change from user's carelessness can be prevented.

Key Figure

Figure 4

Key Words

file identifying descriptor, information control block, file entry, file type, filename change, directory change, PC

SPECIFICATION

Title

FILE MANAGING METHOD FOR A RECORDED DIGITAL DATA STREAM

Brief Description Of The Drawings

FIG. 1 shows partial elements of an optical disk device such as a video disk recorder;

FIG. 2 is an example of a fixed file system for a rewritable disk;

FIG. 3 shows a format of file identifier descriptor and its recording fields;

FIG. 4 is a block diagram of a PC to which a file managing method in accordance with the present invention is applied;

FIGS 5 and 6 recording fields of a file identifying

descriptor and a file entry which are stored as a db in a PC where the present method is applied;

FIG. 7 is a flow diagram of a file management method for a recorded digital stream according to the present invention; and

FIG. 8 is a flow diagram of another file management method for a digital stream to be recorded according to the present invention.

Major Elements In Drawings

1 : optical disk	2 : optical pickup
3 : VDR unit	4 : encoder
10 : disk drive	20 : PC (Personal Computer)
21 : OS(Operating System)	22 : hard disk drive
30 : monitor	

Background Of The Invention

The present invention relates to a file management method of making unchangeable file name or directory of real-time data files through a PC wherein the files are recorded in a disk recording medium such as a rewritable digital versatile disk (DVD-RAM, DVD-RW etc.).

FIG. 1 shows partial elements of an optical device such as a video disk recorder which recording and reproducing a signal to/from a disk recording medium such as a rewritable DVD. The device configured as FIG. 1 comprises an optical pickup 2 reading a signal recorded in a rewritable DVD 1 or writing a data stream processed into a writable signal in the rewritable DVD 1; a VDR unit 3 processing the read signal to restore to original data and converting an inputted data stream into a signal adequate to be written; and an encoder 4 encoding a received analog signal into a data stream which is sent to the VDR (Video Disk Recording) unit 3.

Disk file management method conducted by the optical device connected with a personal computer (PC) through a digital interface is explained referring to the accompanying drawings.

Various types of data files are recorded in the rewritable DVD 1 and the data files consist of data stream files and information files. The data stream files contain text data or real time audio and video (A/V) data of large size and the information files contain control information such as navigation data for the A/V or text data contained in the data stream files.

To manage recorded files, a rewritable DVD may adopt fixed file structure, which is adopted for a DVD ROM disk, composed of a root directory, several title set directories located under the root, and data files having different names and extension located under each title set directory.

FIG. 2 shows an example of such a fixed file structure in which a video title set directory under a root directory has several data files having different extension names.

Under the video title set directory, many files of 'Video_TS.IFO', 'Video_TS.VOB', 'Video_TS.BUP', 'VTS_01_0.IFO', 'VTS_01_1.VOB', 'VTS_01_2.VOB', and 'VTS_01_0.BUP' have been recorded. The file 'Video_TS.IFO' contains video data management information, the file 'Video_TS.VOB' contains menu data of a recorded video object (VOB), the file 'Video_TS.BUP' contains backup data for the video data management information, the file 'VTS_01_0.IFO' contains information on the first video title set, the file 'VTS_01_1.VOB' is the first video object containing A/V data belonging to the first video title set, the file 'VTS_01_2.VOB' is the second video object containing A/V data belonging to the first video title set, and the file 'VTS_01_0.BUP' contains backup information on the first video title set.

Detailed information for the above files is written in a file identifier descriptor (FID) whose fields are shown in FIG. 3A. These fields are 'Descriptor Tag', 'File Version Number', 'File Characteristics', 'Length of File Identifier', 'Information Control Block (ICB)', 'Length of Implementation Use', 'Implementation Use', 'Name of File Identifier', and padding. Among these fields, 'Name of File Identifier' field is used for writing a string indicative of a file name, 'Length of File Identifier' field is used for writing size information of the file name, and 'File Characteristics' field, whose size is 1 byte, is used for writing various attributes of the file. The attributes written in 'File Characteristics' field are shown in FIG. 3B. The first LSB (Least Significant Bit) indicates whether an associated file exists or not, the second LSB indicates whether the file is directory or file, the third indicates deletion of the file, the fourth indicates whether the directory is parent or not, the fifth indicates meta data, and the remaining bits are reserved for future use.

If the first title set recorded in the rewritable DVD 1 having the above file structure is requested to be reproduced after the rewritable DVD 1 is inserted in the optical disk device of FIG. 1, the VDR unit 3 searches the DVD 1 for video title set directory under the root directory, and tries to read the several files under the video title set directory. To read data files and their management file belonging to the first video title set requested to be reproduced, the VDR unit 3 refers to information written in FID. The VDR unit 3 reads data files sequentially after searching them using navigation information written in the management file.

The disk device of FIG. 1 may be connected a personal computer (PC) through a digital interface, so that a user might request file name of a file recorded in the rewritable DVD 1 to be changed into a desirable name through the PC and the

digital interface. In addition, a user might move one or more files under a video title set directory to other directory.

Such changes of file name and directory might be directly conducted with a PC after a rewritable DVD is placed in the PC.

However, the VDR unit 3 searches a rewritable DVD for pre-specified file names under pre-specified directory, which satisfy the file structure shown in FIG. 2, according to a playback-requested video title set or A/V data stream, therefore, the VDR unit 3 could not determine which file to read if the file or directory names have been changed or files have been moved to other directories through a connected PC to the disk device, so that it could not reproduce a playback-requested video title set.

Subject To Solve Through The Invention

It is an object of the present invention to provide a file management method of informing that real-time data files could not be reproduced or that additional recording would be impossible after their file names or related directory scheme written in a rewritable disk are changed at a request from a user through a PC.

Explanation Of The Invention

A file management method according to the present invention checks the type of a file if the file is requested to be renamed or moved, and outputs a message informing that later reproduction of a rewritable disk would fail if the requested operation is conducted if the file type is indicative of real-time data file.

Another file management method according to the present invention checks file type if a file is requested to be moved, and provides a message indicating that disk reproduction would be failed after the file is moved, if the file type is indicative of real-time data file.

In order that the invention may be fully understood,

preferred embodiments thereof will now be described with reference to the accompanying drawings.

FIG. 4 is a simplified block diagram of a personal computer which the file management method according to the present invention is applied to.

An OS 21 of the PC reads management information for data files recorded in a rewritable DVD 1 when the DVD 1 is placed into a disk drive 10.

The OS 21 has information on one or more file types in a read-only memory (ROM) 21a. This file type information stored in the ROM 21a is used for deciding how to respond to the request of renaming or movement of a real-time data file from a user. The read management information includes file identifier descriptors (FIDs) and file entries shown in FIG. 5 is reorganized as a db by the OS 21.

A file identifier descriptor contains an information control block (ICB) to refer to obtain detailed information on a file. The ICB indicates an address of a file entry of FIG. 6A in which an ICB tag is contained. A 1-byte field of file type is written in the ICB tag. A file type indicative of real-time data stream file is defined as number '249' as shown in FIG. 6B in this embodiment.

If a user requests change of file name or directory of an arbitrary data file, the OS 21 checks type of the file and provides a guide message to warn change of file name or directory onto a monitor 30 if the type is indicative of real-time.

This operation is described below in detail.

FIG. 7 is a flow chart embodying a file managing method of a recorded digital data stream in accordance with the present invention. The flow embodiment is to output a warning message if file name change is requested for a real-time data file recorded on a rewritable DVD.

When a rewritable DVD 1 is inserted in the disk drive 10 (S10), the OS 21 reads out all information such as the aforementioned file identifier descriptor and the file entry from the inserted DVD 1 and reorganizes and stores them as a db (S11).

After that, if a file of the DVD 1 is requested to be renamed (S12), the OS 21 searches the ICB of file descriptor db for an address of file entry of the rename-requested file, and checks type of the requested file through referring to the found file entry. If the type of the requested file is ordinary, the OS 21 conducts the renaming operation for the file (S18).

If the type is real-time, namely, if the file is a real-time data file recorded on a rewritable DVD, the OS 21 constructs a message informing that later reproduction of the DVD 1 might be impossible if the file operation is conducted as requested, and then outputs the constructed message onto a monitor 30 (S15).

Through this warning message, a user is notified that the requested operation is so much important that it would cause a fatal result in the disk reproduction.

After the message being outputted, if a user still wants the file renaming to be conducted (S16), the OS 21 renames the file as a user requested(S18). If a user cancels the requested operation, the OS 21 terminates the file renaming operation (S17).

Consequently, in the event that a renaming operation is requested for a file whose renaming would cause a fatal result in a later disk reproduction, a warning message to inform that the requested operation probably causes reproduction failure, thereby, preventing renaming of a real-time data file from a user's carelessness.

In addition, if a file name entered from a user is different from that of a specific file memorized in the ROM 21a

or from one of mandatory files pre-specified in the VDR system 3, the OS 21 also outputs a message to warn that later reproduction would fail.

FIG. 8 is a flow chart embodying another file managing method of a recorded digital data stream in accordance with the present invention. The flow embodiment is to output a warning message if directory change is requested for a real-time data file recorded on a rewritable DVD.

The same as in the embodiment of FIG. 7, when a rewritable DVD 1 is inserted in the disk drive 10 (S30), the OS 21 reads out all information such as the aforementioned file identifier descriptor and the file entry from the inserted DVD 1 and reorganizes and stores them as a db (S31).

After that, if a file of the DVD 1 is requested to be moved to other directory (S32), the OS 21 searches the ICB of file descriptor db for an address of file entry of the movement-requested file, and checks type of the requested file through referring to the found file entry. If the type of the requested file is ordinary, the OS 21 conducts the movement operation for the file (S38).

If the type is real-time, namely, if the file is a real-time data file recorded on a rewritable DVD, the OS 21 constructs a message informing that later reproduction of the DVD 1 might be impossible if the file operation is conducted as requested, and then outputs the constructed message onto a monitor 30 (S35).

Through this warning message, a user is notified that the requested operation is so much important that it would cause a fatal result in the disk reproduction.

After the message being outputted, if a user still wants the file moving to be conducted (S36), the OS 21 moves the file to a destined directory as a user requested(S38). If a user cancels the requested operation, the OS 21 terminates the file

moving operation (S37).

Consequently, in the event that a moving operation is requested for a file whose movement would cause a fatal result in a later disk reproduction, a warning message to inform that the requested operation probably causes reproduction failure, thereby, preventing movement of a real-time data file from a user's carelessness.

Effect Of The Invention

The above-explained file managing method for real-time data file according to the present invention informs that file name or directory change requested through a PC would make it impossible to reproduce or cause reproduction fail of real-time data files which are recorded in a disk recording medium such as a rewritable digital versatile disk. Therefore, file name or directory change from user's carelessness can be prevented.

What is claimed is:

1. A method conducted to manage files written in a rewritable disk, comprising the steps of:

(a) checking the file type if the file is requested to be renamed; and

(b) providing a message indicating that disk reproduction would be failed after the file is renamed, if the file type is real-time.

2. The method set forth in claim 1, further comprising the step of renaming the file as requested, if the requested file operation is demanded again after the message being provided.

3. A method conducted to manage files written in a rewritable disk, comprising the steps of:

(a) checking the file type if the file is requested to be moved; and

(b) providing a message indicating that disk reproduction

would be failed after the file is moved, if the file type is real-time.

4. The method set forth in claim 3, further comprising the step of moving the file as requested, if the requested file operation is demanded again after the message being provided.

5. The method set forth in claim 1 or 3, wherein the file type information is 1 byte in size and is written in a tag field of an information control block included in a file entry.

6. The method set forth in claim 5, wherein the file entry is pointed by an address of the information control block of a file identifier descriptor that includes detailed information for a file.

7. A method conducted to manage files written in a rewritable disk, comprising the steps of:

(a) checking file name of a file that is requested to be renamed to; and

(b) providing a message indicating that disk reproduction would be failed after the file is renamed, if the file name is different from file names pre-specified by a recording standard.

8. The method set forth in claim 7, further comprising the step of renaming the file as requested, if the requested file operation is demanded again after the message being provided.

FIG. 1

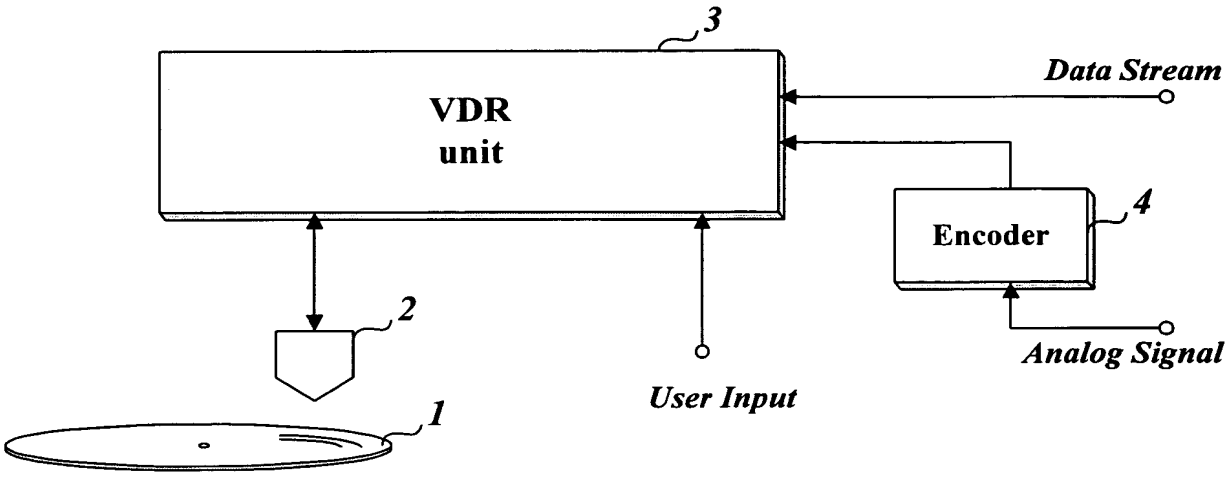

3
VDR
unit
Data Stream
Encoder
4
2
1
User Input
Analog Signal

FIG. 2

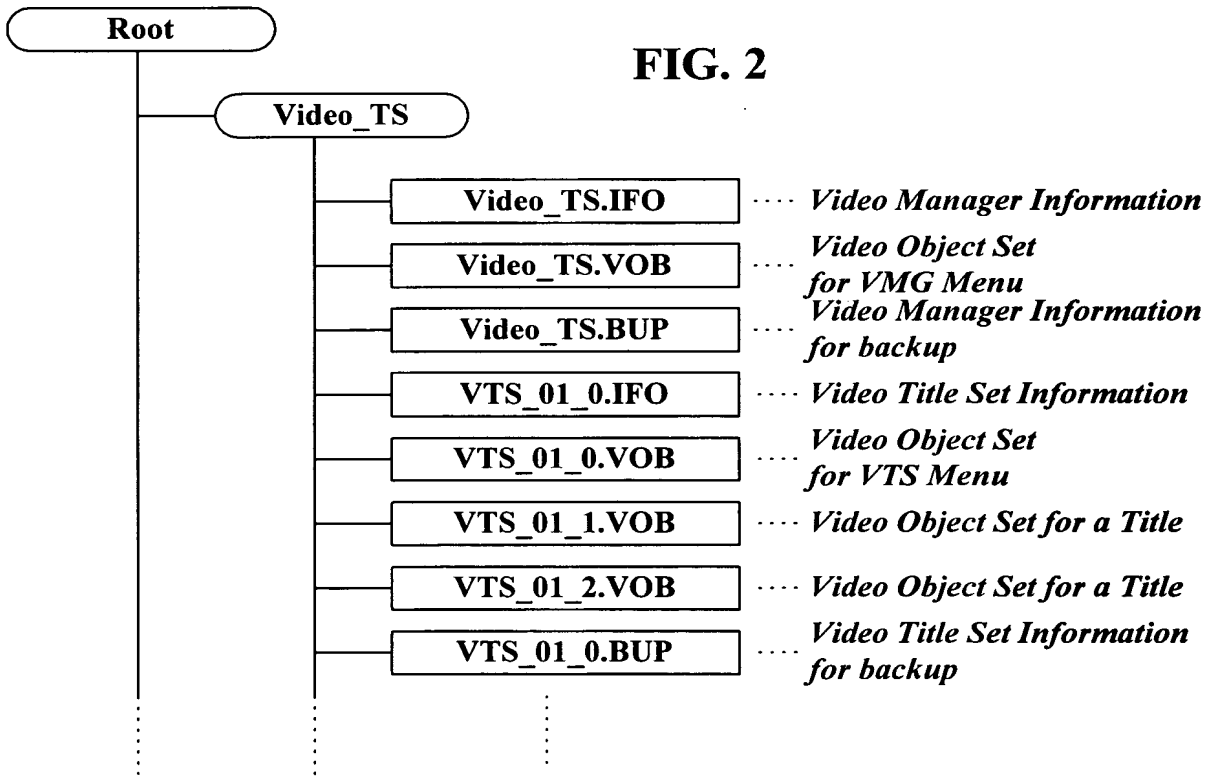

Root
Video_TS
Video_TS.IFO
Video Manager Information
Video_TS.VOB
Video Object Set for VMG Menu
Video_TS.BUP
Video Manager Information for backup
VTS_01_0.IFO
Video Title Set Information
VTS_01_0.VOB
Video Object Set for VTS Menu
VTS_01_1.VOB
Video Object Set for a Title
VTS_01_2.VOB
Video Object Set for a Title
VTS_01_0.BUP
Video Title Set Information for backup

FIG. 3A

File Identifier Descriptor		
RBP	Length	Field Name
0	16	Descriptor Tag
16	2	File Version Number
18	1	File Characteristics
19	1	Length of File Identifier(= L_FI)
20	16	ICB (file entry address)
36	2	Length of Implementation Use(= L_IU)
38	L_IU	Implementation Use
a	L_FI	Name of File Identifier (= N_FI)
b	c	Padding

FIG. 3B

File Characteristics (1Byte)	
0	Existence
1	Directory
2	Deleted
3	Parent
4	Meta-data
5 - 7	Reserved for future Use ('0')

FIG. 4

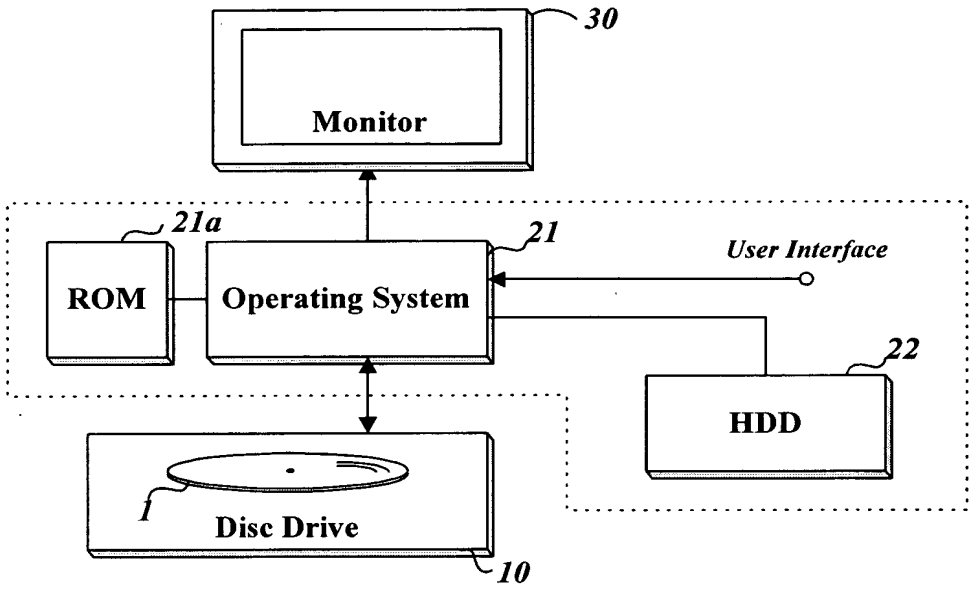

30
Monitor
21a
21
User Interface
ROM
Operating System
22
HDD
1
Disc Drive
10

FIG. 5

File Identifier Descriptor		
RBP	Length	Field Name
0	16	Descriptor Tag
16	2	File Version Number
18	1	File Characteristics
19	1	Length of File Identifier(= L_FI)
20	16	ICB (file entry address)
36	2	Length of Implementation Use(= L_IU)
38	L_IU	Implementation Use
a	L_FI	Name of File Identifier (= N_FI)
b	c	Padding

(a)

File Entry		
RBP	Length	Name
0	16	Descriptor Tag
16	20	ICB Tag
36	4	Uid
⋮	⋮	⋮
176	L_EA	Extended Attributes
[L_EA+176]	L_AD	Allocation Descriptors

(b)

FIG. 6A

ICB Tag		
RBP	Length	Name
0	4	Prior Recorded Number of Direct Entries
4	2	Strategy Type
6	2	Strategy Parameter
8	2	Maxium Number of Entries
10	1	Reserved
11	1	File Type
12	6	Parent ICB Location
18	2	Flags

FIG. 6B

File Type	
Type	Interpretation
0	Shall mean that the interpretation of the file is not specified by this field
1	Shall mean that this is an Unallocated Space Entry
⋮	⋮
249	Shall mean that this is real time file
250~255	Reserved for furture standardiation

FIG. 7

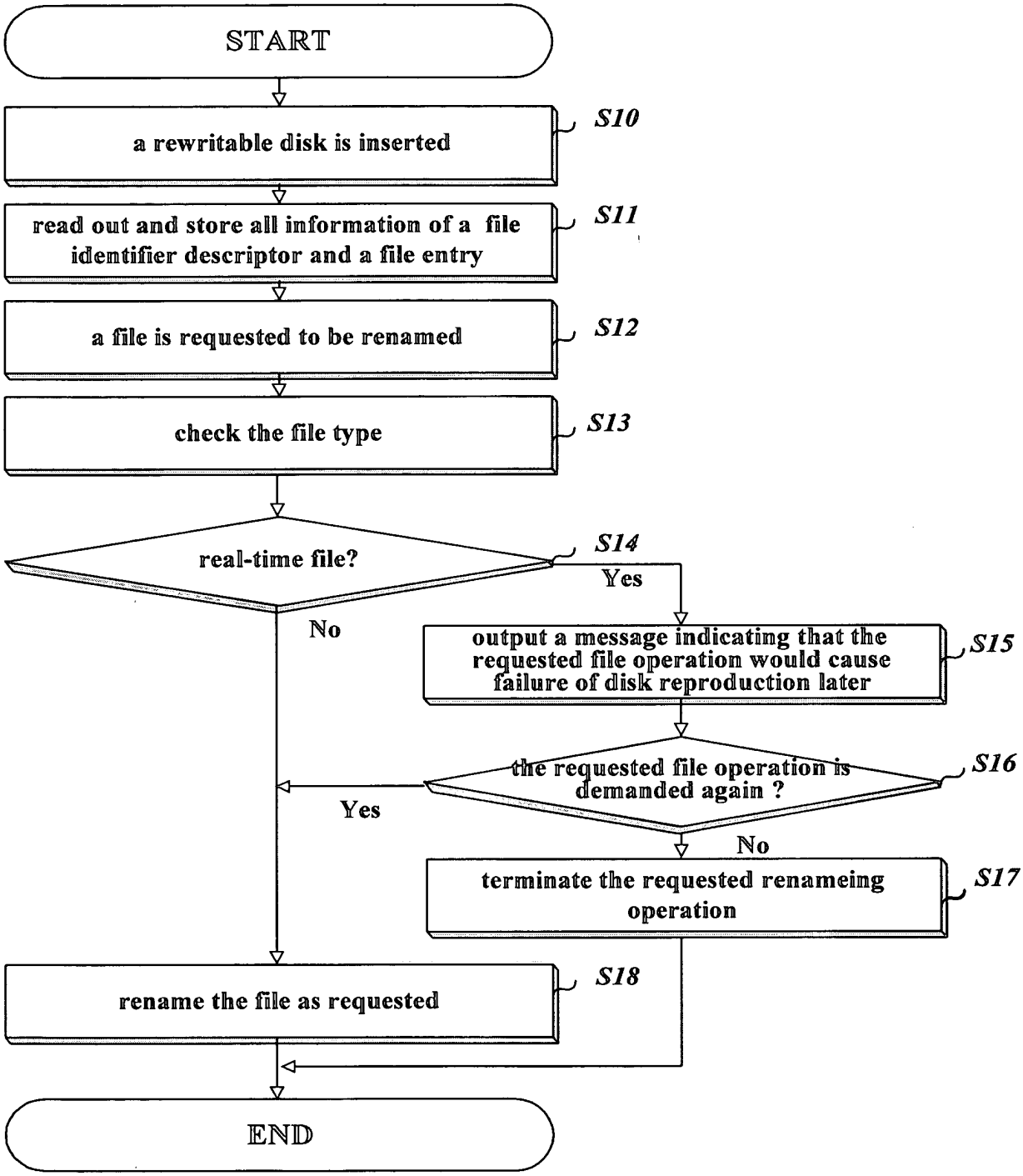
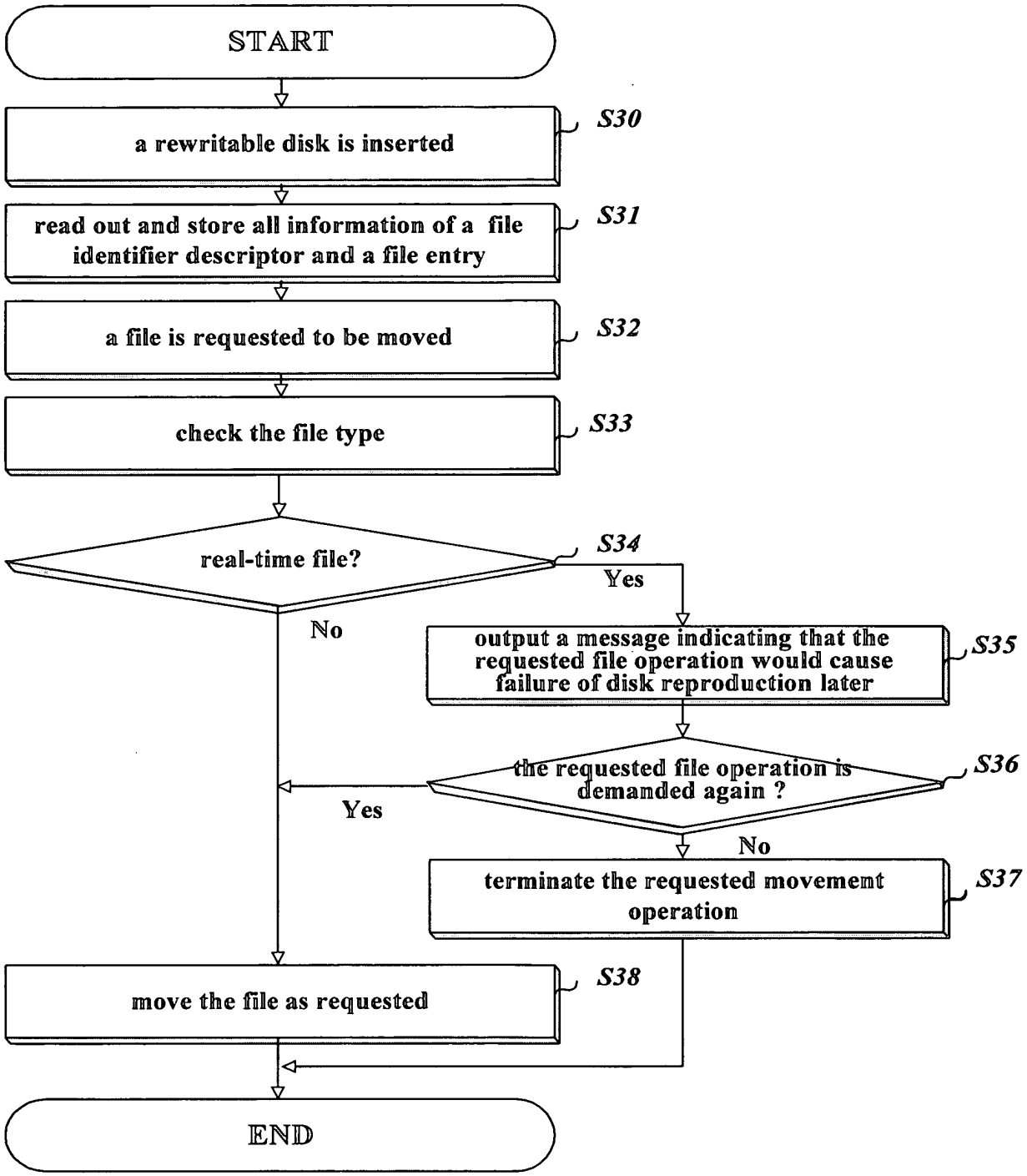

START
a rewritable disk is inserted
S10
read out and store all information of a file identifier descriptor and a file entry
S11
a file is requested to be renamed
S12
check the file type
S13
real-time file?
S14
Yes
No
output a message indicating that the requested file operation would cause failure of disk reproduction later
S15
the requested file operation is demanded again ?
S16
Yes
No
terminate the requested renameing operation
S17
rename the file as requested
S18
END

FIG. 8


START
a rewritable disk is inserted
S30
read out and store all information of a file identifier descriptor and a file entry
S31
a file is requested to be moved
S32
check the file type
S33
real-time file?
S34
Yes
No
output a message indicating that the requested file operation would cause failure of disk reproduction later
S35
the requested file operation is demanded again ?
S36
Yes
No
terminate the requested movement operation
S37
move the file as requested
S38
END